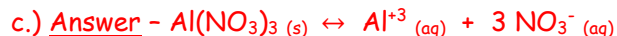
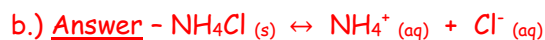
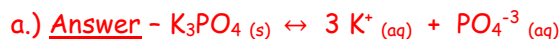
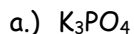


## Chemistry 11 Review

### Dissolving Chemicals in Water

1.) Write the equation for the equilibrium reaction existing in each of the following saturated aqueous solutions.



2.) Write the **crystallization reaction** involving  $MgBr_2 (s)$ . Answer -  $Mg^{2+} (aq) + 2 Br^- (aq) \rightarrow MgBr_2 (s)$

3.) Write the **dissolving reaction** involving  $C_6H_{12}O_6 (s)$ . Answer -  $C_6H_{12}O_6 (s) \rightarrow C_6H_{12}O_6 (aq)$

4.) A container containing a saturated solution of  $NaCl$  is carefully picked up and 100 mL of the solution is poured into a second container. If you are careful not to transfer any of the crystals will the second container's salt solution be saturated?

Answer - No. There must be an equilibrium established for a truly saturated solution. No solids (table salt) means there is no chemical on both sides of the equilibrium so there is no equilibrium.

5.) A student half filled a 100 mL container with water and added a few grams of  $NaCl$  crystals. Seeing the crystals sink and settle on the bottom, the student said the solution must be saturated. Was the student correct? Why?

Answer - No. There is time needed for the dissociation reaction to occur. This could be anywhere from a few minutes to days.

6.) Aluminium fluoride has a solubility of 5.59 g/L at 20°C. Express this solubility in  $\frac{mol}{L}$  or M.

Answer -  $\frac{5.59 g}{L} \times \frac{1 mol}{83.8 g} = 0.06670 M = 0.0667 M AlF_3$

7.) Lead (II) chloride has a solubility of 0.99  $\frac{g}{100.0 mL}$  at 20°C. Calculate the molar solubility.

Answer -  $\frac{0.99 g}{100 mL} \times \frac{1 mol}{278.1 g} \times \frac{1000 mL}{1 L} = 0.035599 M = 0.036 M PbCl_2$

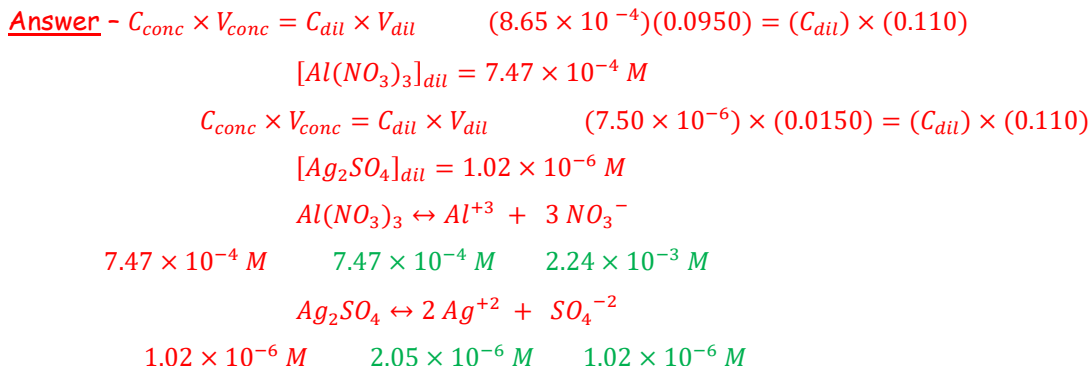
8.) The molar solubility of  $Ag_2CO_3$  is  $1.2 \times 10^{-4} M$  at 25°C. Express this value in  $\frac{g}{100.0 mL}$ .

Answer -  $\frac{1.2 \times 10^{-4} mol}{1 L} \times \frac{275.75 g}{1 mol} \times 0.100 L = 0.003309 g \text{ (per 100 mL)} = \frac{0.0033 g}{100.0 mL} Ag_2CO_3$

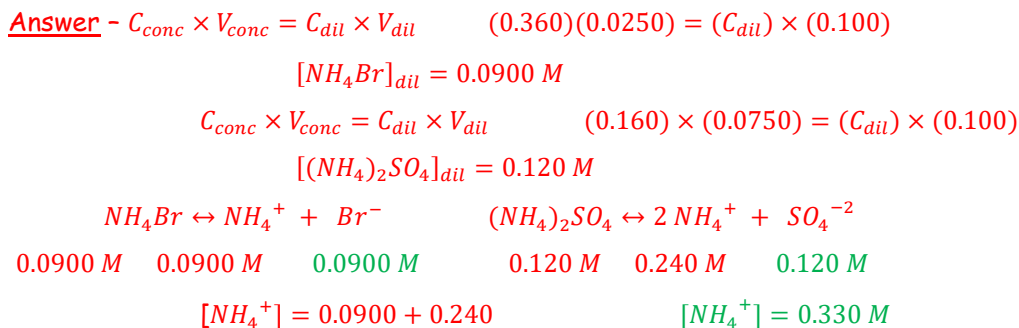




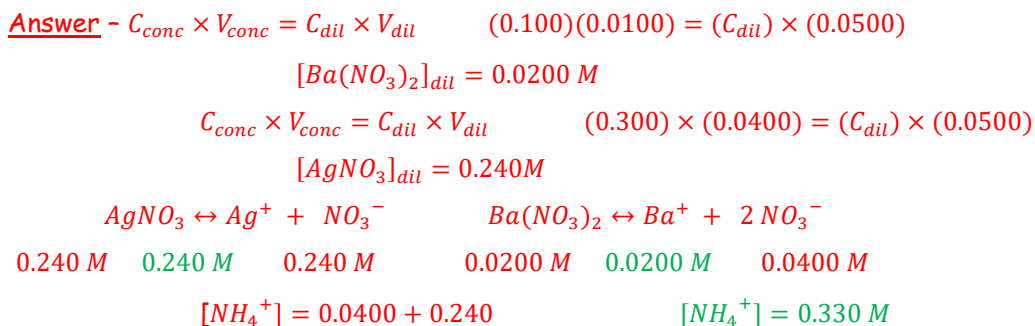
d.) 95.0 mL of  $8.65 \times 10^{-4} \text{ M Al(NO}_3)_3$  is mixed with 15.0 mL of  $7.50 \times 10^{-6} \text{ M Ag}_2\text{SO}_4$ .



e.) 25.0 mL of 0.360 M  $\text{NH}_4\text{Br}$  is mixed with 75.0 mL of 0.160 M  $(\text{NH}_4)_2\text{SO}_4$ .

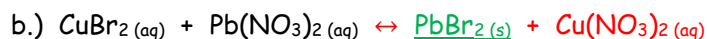
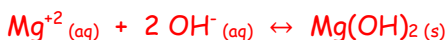
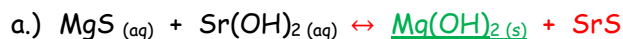


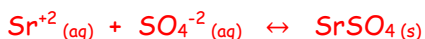
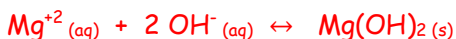
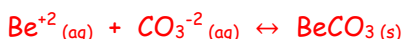
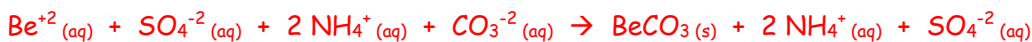
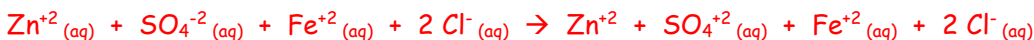
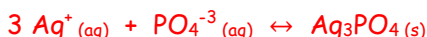
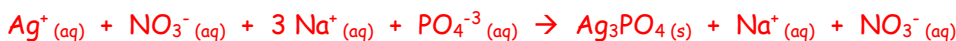
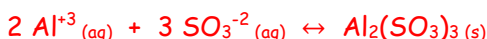
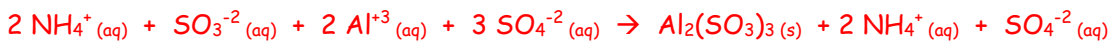
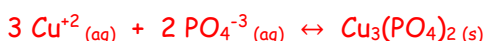
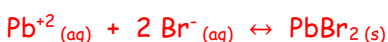
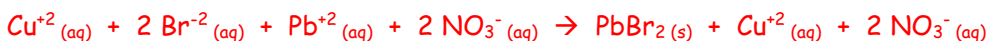
f.) 10.0 mL of 0.100 M  $\text{Ba(NO}_3)_2$  is mixed with 40.0 mL of 0.300 M  $\text{AgNO}_3$ .



13.) For each of the following combinations of equal volumes of 0.20 M aqueous solutions,

- Identify possible products by formula. **red**
- State which (if any) product has a low solubility. **(underlined)**
- If there is a precipitate write the formula equation, total ionic equation, and net ionic equation for the reaction.





14.) Solubility can be used in the field of **Qualitative Analysis**. This field of chemistry involves the use of experimental procedures to determine which elements or ions are present in a substance.

A solution contains  $\text{Al}^{3+}$  and  $\text{Ag}^{+}$ . What **compounds** could be added, and in what order, to separate these ions?

Answer - 1.) Add chloride, bromide, iodine, or sulphate ions to solution. All of these will precipitate out the silver ions.

2.) Add sulphide, hydroxide, phosphate, carbonate, or sulphite ions and aluminium will precipitate out.

15.) A solution contains  $\text{Fe}^{3+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Ag}^{+}$ , and  $\text{Be}^{2+}$ . What **compounds** could be added, and in what order, to separate out these ions?

Answer - 1.) Add  $\text{NaCl}$  or  $\text{KBr}$  or  $\text{NaI}$  ppt  $\text{Ag}^{+}$ . 2.) Add  $\text{K}_2\text{SO}_4$  ppt  $\text{Ca}^{2+}$ .

3.) Add  $(\text{NH}_4)_2\text{S}$  ppt  $\text{Fe}^{3+}$ . 4.) Add  $\text{Na}_3\text{PO}_4$  or  $\text{Na}_2\text{CO}_3$  or  $\text{Na}_3\text{SO}_3$  ppt  $\text{Be}^{2+}$ .